

**IN THE U.S. PATENT AND TRADEMARK OFFICE**

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In re Application of: KLINER, et al. )

Serial Number: **09/778,329** )

Examiner: HOFFMANN, J.M.

Filed: **02/06/02** )

Group Art Unit: 1731

**FOR: PREFORM FOR PRODUCING** )

**AN OPTICAL FIBER AND METHOD** )

**THEREFOR** )

Attorney Docket Number: SD-8317 )  
.....

Commissioner for Patents  
Alexandria, VA 22313-1450

June 25, 2003

**PRELIMINARY AMENDMENT UNDER 37 C.F.R. §1.115**

Sir:

Applicant, through his representative, respectfully submit the following amendment and remarks in a DIVISIONAL of application serial number 09/778,329.

**INTRODUCTORY COMMENTS**

**IN THE CLAIMS**

Original claims 1 – 59 are pending in the instant application for patent. As permitted by 37 CFR §1.121(c), Applicant respectfully requests that Claims 2, 4, 7, and 14 – 59 be withdrawn and canceled, and that Claims 1, 3, 5, 6, 8, 9, 11, and 13 be amended by rewriting the claims be amended by rewriting the claims. The requested amendments are included herewith as an attachment to this response, entitled "Amendments to the CLAIMS."

**IN THE SPECIFICATION**

As required by 37 CFR §1.121(b)(iii), a separate section is attached to this paper that includes pages entitled "Amendments to the SPECIFICATION", in which the changes made to each of the amended PARAGRAPHS is shown. Instructions for amending the Specification are provided below.

In the first line of the application AFTER the TITLE a NEW SECTION entitled "Cross Reference to Related Applications" is introduced. The new section is shown in the attached paper

At page 1 please DELETE the PARAGRAPH beginning on line 14 with the words "The simplest method of preform fabrication " and REPLACE that paragraph with the REPLACEMENT PARAGRAPH shown in the attached paper.

At page 1 please DELETE the PARAGRAPH beginning on line 26 with the words "In order to practice the rod-in-tube ..." and REPLACE that paragraph with the REPLACEMENT PARAGRAPH shown in the attached paper.

At page 6 please DELETE the PARAGRAPH beginning on line 4 with the words "A further another object ..." and REPLACE that paragraph with the REPLACEMENT PARAGRAPH shown in the attached paper.

At page 6, please DELETE the PARAGRAPH beginning on line 7 with the words "Still another object of the invention ..." and REPLACE that paragraph with the REPLACEMENT PARAGRAPH shown in the attached paper.

At page 6, please DELETE the PARAGRAPH beginning at line 14 with the words "Yet another object of the invention ..." and REPLACE that paragraph with the REPLACEMENT PARAGRAPH shown in the attached paper.

At page 13, please DELETE the PARAGRAPH beginning at line 24 with the words "With the present invention, the design " and REPLACE that paragraph with the REPLACEMENT PARAGRAPH shown in the attached paper.

At page 21, please DELETE the PARAGRAPH beginning at line 7 with the words "As shown in FIGURE 10..." and REPLACE that paragraph with the REPLACEMENT PARAGRAPH shown in the attached paper.

At page 21, please DELETE the PARAGRAPH beginning at line 19 with the words "Finally, those skilled in the art " and REPLACE that paragraph with the REPLACEMENT PARAGRAPH shown in the attached paper.

At page 21, please DELETE the PARAGRAPH beginning at line 26 with the words "FIGURE 11 shows the next stage " and REPLACE that paragraph with the REPLACEMENT PARAGRAPH shown in the attached paper.

At page 25, please DELETE the PARAGRAPH beginning at line 20 with the words "However, by simply collecting " and REPLACE that paragraph with the REPLACEMENT PARAGRAPH shown in the attached paper.

## AMENDMENTS TO THE SPECIFICATION

ON PAGE 1

IN THE FIRST LINE OF THE APPLICATION PLEASE ADD A NEW SECTION TITLED "RELATED APPLICATIONS" WITH THE FOLLOWING:

### CROSS REFERENCE TO RELATED APPLICATIONS

This application is a division of, and claims priority to, co-pending prior U.S. Patent Application Serial Number 09/778,329 originally filed 02/06/2001 entitled "PREFORM FOR PRODUCING AN OPTICAL FIBER AND METHOD THEREFOR."

ON PAGE 1

AT ORIGINAL LINE 14 OF THE SPECIFICATION, IN THE PARAGRAPH BEGINNING WITH THE WORDS "The simplest method of preform fabrication " AND ENDING WITH THE WORDS "...replaced the rod-in-tube technique." PLEASE AMEND THE SPECIFICATION AS FOLLOWS:

The simplest method of preform fabrication is the so-called "rod-in-tube" method such as is disclosed and described in patent serial numbers 4,668,263 and 4,264,347. A rod of glass that will form the core of the fiber is inserted into a thick-walled tube that will become the cladding, and the two are fused together at high temperature. The relative dimensions of the core and cladding in the drawn fiber are identical to that of the original preform. The main advantage of the rod-in-tube technique is its simplicity and as such it was used almost exclusively during the earliest years of fiber development. However, while simple, this technique was also quite limited in its ability to implement optical fiber designs having any but the most rudimentary characteristics, ~~and n~~ Newer methods capable of producing ultra-low-loss fibers, such as are required for optical telecommunications, have essentially replaced the rod-in-tube technique.

ON PAGE 1 AND CONTINUING TO PAGE 2

AT ORIGINAL LINE 26 OF THE SPECIFICATION, IN THE PARAGRAPH BEGINNING WITH THE WORDS "In order to practice the rod-in-tube " AND ENDING ON PAGE 2 WITH THE WORDS "...most notably transition metals." PLEASE AMEND THE SPECIFICATION AS FOLLOWS:

In order to practice the rod-in-tube method, bulk glass is usually synthesized by mixing together the various ingredients in powder form and melting the mixture in a high-temperature furnace. All modern preform fabrication methods, however, are based instead on vapor-deposition techniques. The core and cladding materials are formed by reacting various gas-phase precursors at high temperature to form a glass "soot" that is subsequently sintered into a solid material. A principle advantage of the vapor-deposition process is its inherent capacity for providing a built-in purification step that immediately precedes the synthesis step. Starting reagents (liquids or solids) are heated and delivered to a reaction zone as a vapor phase. This distillation-like process leaves behind the vast majority of contaminating species typically present as trace constituents in the starting reagent materials, most notably transition metals.

ON PAGE 6

AT ORIGINAL LINE 4 OF THE SPECIFICATION, IN THE PARAGRAPH BEGINNING WITH THE WORDS "A further another object " AND ENDING WITH THE WORDS "...central core region" PLEASE AMEND THE SPECIFICATION AS FOLLOWS:

A further ~~another~~ object of this invention is to provide a glass preform for use in fabricating a multimode optical fiber having a non-uniform dopant distribution within a central core region.

ON PAGE 6

AT ORIGINAL LINE 7 OF THE SPECIFICATION, IN THE PARAGRAPH BEGINNING WITH THE WORDS "Still another object of the invention " AND ENDING WITH THE WORDS "...forgoing characteristics" PLEASE AMEND THE SPECIFICATION AS FOLLOWS:

Still another object of the invention is to provide a glass preform for use in fabricating

a polarization-maintaining optical fiber, and for providing such a fiber exhibiting any or all of the ~~forgoing~~foregoing characteristics

ON PAGE 6

AT ORIGINAL LINE 14 OF THE SPECIFICATION, IN THE PARAGRAPH BEGINNING WITH THE WORDS "Yet another object of the invention " AND ENDING WITH THE WORDS "...properties and characteristics." PLEASE AMEND THE SPECIFICATION AS FOLLOWS:

Yet another object of the invention is to provide a glass preform for fabricating optical fibers having any combination of the ~~forgoing~~foregoing properties and characteristics.

ON PAGE 13 AND CONTINUING TO PAGE 14

AT ORIGINAL LINE 24 OF THE SPECIFICATION, IN THE PARAGRAPH BEGINNING WITH THE WORDS "With the present invention, the design " AND ENDING ON PAGE 14 WITH THE WORDS "...to suit the requirements of the application.)" PLEASE AMEND THE SPECIFICATION AS FOLLOWS:

With the present invention, the design and fabrication of such customized preforms becomes realistic. FIGURE 7 shows a representative preform for a step-index fiber with a cladding-to-core diameter ratio of about 10:3 and wherein the rare-earth dopant is confined to a central region of the core having a diameter about one-half (1/2) that of the core region. (Typical, representative dimensions of these regions would be a 200  $\mu\text{m}$   $\varnothing$  cladding and a 60  $\mu\text{m}$   $\varnothing$  core region, comprising a 15  $\mu\text{m}$  thick annular ring surrounding a 30  $\mu\text{m}$   $\varnothing$  central, rare-earth-doped core zone. Each of these dimensions may be varied, however, to suit the requirements of the application.)

ON PAGE 21

AT ORIGINAL LINE 7 OF THE SPECIFICATION, IN THE PARAGRAPH BEGINNING WITH THE WORDS "As shown in FIGURE 10, " AND ENDING WITH THE WORDS "...placed on its side before" PLEASE AMEND THE SPECIFICATION AS FOLLOWS:

As shown in FIGURE 10, a preform template **1004** delineates the core/cladding

boundary, showing directly which cladding rods should be removed. ~~Perform~~Preform template **1004** can, of course, be modified to improve the ease with which the transfer of rods is accomplished. In particular, the “stepped” central portion of the template can be replaced with a removable plug **1005** that allows the user to partially displace the desired rods, as shown. Plug **1005** then would be removed, and the displaced volume in the ~~perform~~preform bundle would be “back-filled” through the hole left behind by the plug with new glass rods having the desired property (e.g., core rods). This procedure, therefore, prevents the cladding rods from inadvertently moving during the replacement process because the core region of the preform always contains substantially the same volume of glass rods as core rods **1003** are displaced. ~~contained within tube **1004** would be placed on its side before~~

ON PAGE 21

AT ORIGINAL LINE 19 OF THE SPECIFICATION, IN THE PARAGRAPH BEGINNING WITH THE WORDS “Finally, those skilled in the art ” AND ENDING WITH THE WORDS “...to the finished perform” PLEASE AMEND THE SPECIFICATION AS FOLLOWS:

Finally, those skilled in the art will appreciate that preform template **1004** can comprise any number of distinct regions, or plugs, having a variety of shapes, sizes, and locations (e.g., for the stress elements described in the context of PM fibers). This approach thus provides a simple method for assembling a preform bundle, with wide flexibility in the range and complexity of physical structures and chemical properties imparted to the finished ~~perform~~preform.

ON PAGE 21 AND CONTINUING TO PAGE 22

AT ORIGINAL LINE 26 OF THE SPECIFICATION, IN THE PARAGRAPH BEGINNING WITH THE WORDS “FIGURE **11** SHOWS THE NEXT STAGE ” AND ENDING ON PAGE 22 WITH THE WORDS “...AN AMPULE **1200** AS SHOWN IN FIGURE **12.**” PLEASE AMEND THE SPECIFICATION AS FOLLOWS:

FIGURE **11** shows the next stage of processing. Bundle **1000** is transferred into a second cladding tube **1100** in which it is suspended and immobilized between two

plugs, e.g., of fiberglass wool **1105** (ultra-high purity silica, available commercially). Fiberglass packing **1105** prevents the bundle from sliding in cladding tube **1100** and ensures that there is no relative movement of rods within bundle **1000**. This second cladding tube **1100** is fabricated with an inner lip or waist **1101** (formed by partial collapse of the cladding tube under vacuum) to provide mechanical support of the above assembly. Because the fiberglass plug is porous, the entire assembly can be cleaned and dried in place, without any need to handle the bundle directly, thereby preventing contamination. The cleaning and drying steps would likely involve both liquid-phase and gas-phase processes, similar to those used with the MCVD method. The cleaned and dried assembly is then evacuated and the cladding tube sealed off at both ends to form an ampule **1200** as shown in FIGURE 12.

ON PAGE 25

AT ORIGINAL LINE 20 OF THE SPECIFICATION, IN THE PARAGRAPH BEGINNING WITH THE WORDS "HOWEVER, BY SIMPLY COLLECTING " AND ENDING WITH THE WORDS "...AND THE AMPULE WOULD BE SEALED." PLEASE AMEND THE SPECIFICATION AS FOLLOWS:

However, by simply collecting the oxide soots of individual reactant species generated in separate reaction processes in the glass ampule *by weight*, it is far more likely that a final target glass composition can be achieved accurately and reproducibly. This result would be achieved by combusting a single reactant gas stream and determining the incremental weight gain of the ampule as the oxide soot collects on its interior walls until a target weight is achieved. The process would be repeated with each subsequent reactant specie until each had been combusted and the desired quantity of its oxide collected. The collected powders would be mixed (e.g. by tumbling them within the ampule), and the ampule would be sealed.

## AMENDMENTS TO THE CLAIMS

1. (currently amended) A method for providing a glass preform for use as a source for drawing an optical fiber, the method comprising the steps of:

collecting a plurality of first glass rods into a substantially contiguous bundle, wherein each of said first glass rods comprises a chemical composition and ~~has a~~ substantially uniform shape, wherein said chemical composition of each of said first glass rods is chosen to provide one of two or more different refractive indices, and wherein said step of collecting further includes the step of combining said first glass rods to provide a predetermined target refractive index wherein a numerical average of said two or more refractive indices is substantially equal to said predetermined target refractive index;

inserting said contiguous bundle into a glass tube, wherein said glass tube has an inside diameter chosen to contain said contiguous bundle, forming thereby a preform assembly; and

heating said ~~contiguous bundle~~preform assembly to a glass fusion temperature and causing said ~~contiguous bundle~~preform assembly to fuse to form a solid glass preform such that said chemical composition of each of said first glass rods is maintained in a location proximate or about coincident with a position of each said glass rods within said contiguous bundle.

2. (currently canceled)

3. (currently amended) The method of claim 2~~1~~, wherein said step of heating further comprises heating said contiguous bundle such that fusion begins at one end progresses along a length of said preform assembly.

4. (currently canceled)

5. (currently amended) The method of claim 4~~1~~, wherein said first glass rods are ~~combined so as to be~~ randomly distributed throughout said contiguous bundle.



6. (currently amended) The method of claim ~~4~~1, wherein said first glass rods are ~~combined so as to be~~ evenly and non-randomly placed throughout said contiguous bundle.

7. (currently canceled)

8. (currently amended) The method of claim 1, further including the step of removing ~~and replacing~~ one or more groups of contiguous first glass rods, and the step of replacing said one or more groups with an equivalent number of groups ~~comprising of contiguous~~ second glass rods, ~~said second glass rods comprising a chemical composition and having a substantially uniform shape, said second glass rods~~ comprising a physical or chemical property ~~having a different~~ whose value is different than ~~asaid~~ value of said same physical or chemical property of said first glass rods, wherein said one or more groups are disposed about a center of said contiguous bundle or about said center point and between first and second radii about said center point.

9. (currently amended) The method of claim 8, wherein the steps of removing and replacing further includes the step of partially displacing said one or more first groups from said preform assembly.

10. (currently canceled)

11. (currently amended) The method of claim ~~8~~9, wherein the step of partially displacing, ~~and the step of removing and replacing, are~~ is performed by inserting a stepped template into one end of said glass tube and against one end of each of said first glass rods, said stepped template having one or more steps or plugs, said steps or plugs acting to partially displace said one or more groups of first glass rods.

12. (original) The method of claim 11, wherein said plugs have a desired shape and size and are located in a desired position in a cross section of said preform assembly.

13. (currently amended) The method of claim 12, wherein said one or more plugs of said stepped template are removable, and wherein said step of removing and replacing further includes the step of removing one or more of said plugs such that longitudinal

spaces equivalent to each said one or more plug shapes remain within said stepped template and within said ~~perforated~~contiguous bundle adjacent to said stepped template, said spaces in said stepped template and said ~~perforated~~contiguous bundle acting as a guide to allow entry, and for inserting and fully displacing each of said one or more groups of said first glass rods with said one or more equivalent groups of said second glass rods.

14. (currently canceled)

15. (currently canceled)

16. (currently canceled)

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59. (currently canceled)

## REMARKS

### IN THE SPECIFICATION:

Applicants respectfully note that the specification has been amended in order to correct multiple errors in spelling, punctuation and syntax.

At page 1, in line 21 a comma is ADDED AFTER the word "simple", The change is made to correct the punctuation of the sentence.

At page 1, in line 23, the comma AFTER the word "characteristics" is DELETED and REPLACED with a period, The word "and" following the deleted comma is itself DELETED and a new sentence begun by CAPITALIZING the word "new", The change is made to correct the punctuation and syntax of these sentences.

At page 1, in line 26, the punctuation of the sentence is corrected by ADDING a comma AFTER the word method.

At page 6, in line 4 the word "another" AFTER the word is "further" is DELETED. The change is made to correct the syntax of the sentence.

At page 6, in lines 9 and 15 the SPELLING of the word "forgoing" is CORRECTED to read "foregoing".

At page 14, line 3 the word "dimension" is DELETED and REPLACED with the word --dimensions--.The changes are made to correct the syntax of the sentence.

At page 21, in line 17, the word "contain" AFTER the word "always" is DELETED and REPLACED with the phrase -- contains substantially the same volume of glass --.And the phrase -- as core rods 1003 are displaced --is ADDED AFTER the word "rods" and BEFORE the period ending the sentence. Sentence fragment "contained within tube 1001 would be placed on its side before" is DELETED as superfluous. The change is made to better describe the Applicants' invention. Support is found at page 21, line 5 of the written specification.

At page 22, in line 8 the comma following the word "processes" is DELETED. The change is made to correct the punctuation of that sentence,

At page 25, in line 5, a comma is INSERTED AFTER the italicized words "by weight The change is made to correct the punctuation of that sentence.

No new matter has been added as a result of the forgoing amendments.

## IN THE CLAIMS:

**Claims 2, 4, 7, 10, and 14 – 59 are requested canceled without prejudice.**

Claims 1, 3, 5, 6, 8, 9, 11, and 13 are amended as follows:

IN CLAIM 1

In line 4 of the claim, the word “has” AFTER the word “and” is DELETED.

In line 5 of the claim, AFTER the word “shape” the clause is amended to include the following:

    , wherein said chemical composition of each of said first glass rods is chosen to provide one of two or more different refractive indices, and wherein said step of collecting further includes the step of combining said first glass rods to provide a predetermined target refractive index wherein a numerical average of said two or more refractive indices is substantially equal to said predetermined target refractive index;

    inserting said contiguous bundle into a glass tube, wherein said glass tube has an inside diameter chosen to contain said contiguous bundle, forming thereby a preform assembly--

The change is made to clarify the scope and nature of the invention by incorporating the limitations of canceled claims 4 and 2.

In ORIGINAL lines 6 and 7, the words “contiguous bundle” AFTER the words “heating said” and “causing said”, respectively, are DELETED and replaced with the words -- preform assembly -- . The change is made to correct and conform form this clause with the newly inserted step of “inserting”. Support is found in canceled claim 2.

IN CLAIM 3

In ORIGINAL line 1 of the claim, the dependency of the claim is changed from claim “2” to claim -- 1 -- . The change is made to account for the cancellation of claim 2.

IN CLAIMS 5 & 6

In ORIGINAL line 1 of the claim, the dependency of the claim is changed from claim “4” to claim -- 1 -- . The change is made to account for the cancellation of claim 4.

In ORIGINAL line 2 of the claim, the words “combined so as to be” are DELETED in order to remove a source of indefiniteness.

IN CLAIM 8

In ORIGINAL line 1 of the claim, the word “step” is changed to -- steps -- . The change is made to clarify the claim by emphasizing that “removing and replacing” are two separate steps.

In ORIGINAL line 3 of the claim, the word “comprising” is DELETED and REPLACED with the words -- of contiguous -- and the phrase “, said second glass rods comprising a chemical composition and having a substantially uniform shape, said second glass rods” AFTER the words “second glass rods” is DELETED. The first change is made to further describe the “second glass rods”. Support is found at page 21 of the written specification and ORIGINAL claim 14, now withdrawn. The second change is made to remove redundancy in the clause and to conform the description of the second glass rods with that of the first glass rods as describe in the 5<sup>th</sup> and 6<sup>th</sup> lines of the ORIGINAL claim.

In ORIGINAL line 5 of the claim, the words “having a different” are DELETED and the word -- different -- is INSERTED AFTER the word “value”. The change is made to clarify the claim by correcting the syntax of the sentence.

In ORIGINAL line 6 of the claim, the indefinite article “a” BEFORE the word “value” is DELETED and REPLACED with the definite article -- said -- to correct the antecedence of the clause.

At the end of ORIGINAL line 6 of the claim, the phrase - - , wherein said one or more groups are disposed about a center of said contiguous bundle or about said center point and between first and second radii about said center point - - is ADDED BEFORE the period ending the sentence. The change is made to further describe the invention. Support is found at page 21 of the written specification and in FIGs. 7 – 10.

IN CLAIM 9

In ORIGINAL line 1 of the claim, the word “step” is changed to - - steps - - in order to conform this claim with the change made in amended claim 8. .

IN CLAIM 11

In ORIGINAL line 1 of the claim, the dependency of this claim is changed from “8” to -- 9 --. The change is necessitated by the need to provide proper antecedence to the term “displacing”.

In ORIGINAL line 1 of the claim, the word -- partially -- is INSERTED BEFORE the word “displacing” again to provide proper antecedent description for “displacing”.

In ORIGINAL lines 1 and 2 of the claim, the phrase “, and the step of removing and replacing,” is DELETED and verb “are” is changed to the singular form -- is -- . The former change is made to remove redundancy due to the change of the claim dependency. The second change is necessary to conform the syntax of the sentence due to the deletion of the prior phrase.

IN CLAIM 13

In ORIGINAL lines 5 and 6 of the claim, the word “preform” BEFORE the word “bundle” is DELETED and REPLACED with the word -- contiguous -- in order to correct the description of the glass rod bundle described in claim 1.



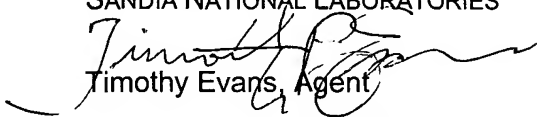
CONCLUSION

Applicant respectfully submit, in addition to original claim 12, amended claims 1, 3, 5, 6, 8, 9, 11, and 13 and assert that the instant invention now described claims a unique method that is neither anticipated, suggested nor taught by the prior art. Favorable consideration of claims now presented and allowance of this application is earnestly solicited.

This response is, therefore:

Respectfully submitted by,

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Timothy Evans, Agent



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CERTIFICATION UNDER 37 CFR 1.10

I hereby certify that this New Application Transmittal and the documents referred to as enclosed therein are being deposited with the U. S. Postal Service on **JUNE 25, 2003**, in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number EL177881975US, addressed to: Mail Stop Patent Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

Date of Deposit: 6-25-03

  
Person Making Deposit  
  
Signature

"Express Mail" Mailing Label No. EL177881975US

Attachments:

Preliminary Amendment including:  
Marked Version of Amendments to the SPECIFICATION  
Marked Version of Amended CLAIMS  
PTO SB/05 Transmittal Letter  
PTO SB/17 Fee Transmittal / Copy  
Return Receipt Postcard